PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 22247-10501	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US03/27012	International filing date *(day/month/year)* 29 August 2003 (29.08.2003)	Priority date *(day/month/year)* 09 September 2002 (09.09.2002)
International Patent Classification (IPC) or national classification and IPC IPC(7): A61K 35/78 and US Cl.: 424/725		
Applicant MITOCHROMA RESEARCH, INC.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
09 April 2004 (09.04.2004)	10 January 2005 (10.01.2005)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Michael V. Meller F. Roberts for Telephone No. 571-272-1600

Form PCT/IPEA/409 (cover sheet)(July 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/27012

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed.

☒ the description:
pages 1-36 as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☒ the claims:
pages 38, 39 _____, as originally filed
pages NONE _____, as amended (together with any statement) under Article 19
pages NONE _____, filed with the demand
pages 37, 40, 41 _____, filed with the letter of 13 August 2004.

☒ the drawings:
pages 1-13 _____, as originally filed
pages NONE _____, filed with the demand
pages NONE _____, filed with the letter of _____.

☐ the sequence listing part of the description:
pages NONE _____, as originally filed
pages NONE _____, filed with the demand
pages NONE _____, filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages NONE

☐ the claims, Nos. NONE

☐ the drawings, sheets/~~fig~~ NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*
*** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/27012

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims	NONE	YES
	Claims	1-17	NO
Inventive Step (IS)	Claims	NONE	YES
	Claims	1-17	NO
Industrial Applicability (IA)	Claims	1-17	YES
	Claims	NONE	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-17 lack novelty under PCT Article 33(2) as being anticipated by Ashai Beer Malt KK. The reference teaches that the extract is in a snack food which will be ingested.

Claims 1-17 lack an inventive step under PCT Article 33(3) as being obvious over Asahi Beer Malt KK. The references teaches that the extract will be ingested in a snack food and to administer it to someone having diabetes is obvious since people with diabetes also eat snack foods.

Claims 1-17 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

CLAIMS

We claim:

1. A method for activating 5'-monophosphate-activated protein kinase (AMPK) in a patient in need thereof, the method comprising administering to said patient a composition comprising a therapeutically effective amount of a compound that activates AMPK, wherein the compound that activates AMPK has the structure of a compound purified from an extract of ground barley malt.

2. The method of claim 1, wherein the compound that activates AMPK is purified from an extract of ground barley malt.

3. The method of claim 1, wherein the compound purified from an extract of ground barley malt is obtainable through a purification process comprising:

   (1) fractionating the extract of ground barley malt by ion exchange chromatography into protein fractions;

   (2) collecting one or more protein fractions; and

   (3) removing protein from the protein fractions by molecular sieving chromatography to result in a purified compound that activates AMPK.

4. The method of claim 3, wherein one or more collected protein fractions comprise a thaumatin-like protein.

5. The method of claim 4, wherein a thaumatin-like protein is removed from the one or more collected protein fractions by molecular sieving chromatography.

6. The method of claim 1, wherein the patient suffers from obesity.

7. The method of claim 1, wherein the patient suffers from insulin resistance.

(21) lowers blood glucose concentrations by decreasing hepatic glucose production and/or increasing glucose disposal in skeletal muscle; and

(22) ameliorates one or more conditions or disorders associated with insulin resistance syndrome through improving glucose tolerance, improving lipid profile or reducing systolic blood pressure.

10. A method for treating a patient suffering from a condition or disorder associated with AMPK regulation, the method comprising administering to said patient a composition comprising a therapeutically effective amount of a compound that activates AMPK, wherein the compound that activates AMPK has the structure of a compound purified from an extract of ground barley malt.

11. The method of claim 10, wherein the compound that activates AMPK is purified from an extract of ground barley malt.

12. The method of claim 10, wherein the compound purified from an extract of ground barley malt is obtainable through a purification process comprising:

(1) fractionating the extract of ground barley malt by ion exchange chromatography into protein fractions;

(2) collecting one or more protein fractions; and

(3) removing protein from the protein fractions by molecular sieving chromatography to result in a purified compound that activates AMPK.

13. The method of claim 10, wherein the condition or disorder is obesity.

14. The method of claim 10, wherein the condition or disorder is insulin resistance.

15. The method of claim 10, wherein the condition or disorder is selected from the group consisting of: non-insulin dependent (type 2) diabetes mellitus, high blood pressure, elevated levels of triglycerides, hyperinsulinemia, elevated cholesterol,

glucose intolerance, low levels of high density lipoprotein (HDL), ischemia, hypoxia and glucocorticoid-induced apoptosis.

16. A process for purifying from an extract of ground barley malt a composition comprising a compound that activates AMPK, the process comprising:

(1) fractionating the extract of ground barley malt by ion exchange chromatography into protein fractions;

(2) collecting one or more protein fractions; and

(3) removing protein from the protein fractions by molecular sieving chromatography to result in a purified compound that activates AMPK.

17. A composition comprising a compound that activates AMPK, wherein the compound comprises the same structure as the compound recited in claim 16 that activates AMPK.